

# RTU870

## Configuration Tool Installation and User Guide

Version 2.10

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**BRODERSEN**  
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## 1. Introduction

This installation and user guide is a guide for installing and using the RTU870 configuration software provided for the Brodersen RTU870 Small Utility RTU types. The guide covers installation of the configuration software and detailed descriptions of all the setup possibilities for the RTU870.

The guide is parted in sections of which you can select the appropriate parts. The main parts are Installation and a User Guide section which is listing the setup possibilities for the RTU870 and describing options for each changeable option.

If you have any question not covered in this guide please refer to the RTU870 data sheet or the Interoperability document. Questions can furthermore be addressed to our application and support department.



## 2. Index

1.	Introduction .....	2
2.	Index .....	3
3.	General Information .....	5
4.	System Requirements .....	5
5.	Short Form Installation Guide .....	5
6.	Detailed Installation Guide .....	7
7.	User Guide .....	10
7.1	Starting RTU870 Configuration tool.....	10
7.2	Selecting language.....	10
7.3	Special program options.....	10
7.3.1	View system log .....	10
7.3.2	Lock at last .....	11
7.3.3	Clear the system log.....	11
7.3.4	Add Msg to System Log .....	11
7.3.5	Save System Log As .....	11
7.3.6	Print System Log .....	11
7.3.7	elp Options .....	11
7.4	rocedure for setting up the RTU870 .....	11
7.5	Saving and Restoring Configuration Data Files .....	12
7.6	Closing the RTU870 Configuration Tool and the Drivers.....	12
8.	RTU870 Address Information .....	13
8.1	Addressing of physical I/Os to ASDU IOAs .....	13
9.	Setup and configuration parameters.....	15
9.1	EN/IEC60870-5-101 parameters .....	15
9.1.1	Sub-folder General .....	15
9.1.2	Sub-folder Digital I/O .....	16
9.1.3	Sub-folder Analogue I/O.....	17
9.2	General module parameters – Config folder .....	18
9.3	COM1 cfg.....	18
9.3.1	Link addr.....	18
9.3.2	LinkAddrOct.....	18
9.3.3	Baud rate .....	19
9.3.4	Use E5 resp.....	19
9.3.5	Resp. Delay .....	19
9.3.6	RTS Leading .....	19
9.3.7	RTS Trailing .....	19
9.3.8	Retry counts .....	19
9.3.9	Max comm cnt. ....	19
9.3.10	Subs. to try. ....	19
9.3.11	Redial delay.....	19
9.3.12	Tel. no. ....	19
9.3.13	Modem init.....	19
9.3.14	PIN code.....	19
9.3.15	Modem Re-init. ....	19
9.3.16	Dial back.....	19
9.3.17	User.....	20
9.3.18	Date/Time .....	20
9.3.19	Boot delay .....	20
9.3.20	S0 Cnt Type .....	20
9.3.21	S0 Interval .....	20
9.3.22	Analogue Range.....	20
9.3.23	COM2 cfg – Modbus Slave Port.....	20
9.3.24	Baud rate .....	20
9.3.25	Parity .....	20
9.3.26	Handshake .....	20
9.3.27	RTS Leading .....	20
9.3.28	RTS Trailing .....	20



9.4	COM 3 cfg Meter Port .....	21
9.4.1	Use Driver .....	21
9.4.2	Baud Rate .....	21
9.4.3	Cmd Msg Time .....	21
9.4.4	Rsp Msg Size .....	21
9.5	Node info folder .....	21
9.6	I/O folder .....	21
10.	Uninstalling the software.....	22
11.	Special notice for Windows Vista users.....	22
	Appendix A IOA List .....	23
	Appendix B Maximum I/O Configuration of RTU870.....	24



### 3. General Information

The configuration software IOTOOL870 is delivered on a CD.

During the installation of the IOTOOL870, all the basic drivers for communicating with the RTU870 are installed and then ready for use with the RTU870 Configuration tool.

When using the RTU870 configuration tool to generate a configuration file, it is required that a RTU870 physically is connected to the PC. Some parts of the setup require direct reading in the RTU for showing the setup options. When you have made a configuration setup on one module you are able to store the settings in a project file. The project file will contain all settings and you can then easily copy the project file to other computers for downloading the RTU setting into other RTUs.

Important note: When you are running the RTU870 Configuration tool, you are using the IOTOOL32 driver on the COM port. The driver requires full service from the COM port and it does not accept any other programs are using the COM port. After closing the RTU870 software, you must close the basic driver. You find the driver icon on the bottom right side of your screen. Point at the icon, right click your mouse and close the driver – now your COM port is free for use by other programs.

### 4. System Requirements

The configuration software require minimum

**Hardware:**

IBM compatible PC with a Pentium Processor  
32 MB RAM (Win NT)  
30 MB free hard disk space  
Mouse and keyboard  
SVGA monitor (minimum display resolution: 600 x 800, Small Fonts)  
CD-ROM or DVD drive.  
1 serial RS232 port – direct or via a USB-to-RS232 device.

**Software:**

32 bit operating system  
MS Windows2000, NT4.0, XP or Vista.

### 5. Short Form Installation Guide

Before you start installation of the software please make sure that you not have any prior versions of IOTOOL32Pro and RTU870 Configuration Tool installed. If that is the case, you must uninstall IOTOOL32Pro from the Remove Software option in the Control Panel and delete the RTU870 Configuration Tool folder on your desktop.

Place the installation CD in you CD drive and if autorun is enabled on your PC the installation will start automatically. If not you must type D:\setup in the Run windows located under the Start button on your MS Windows desktop.

Now the installation of the IOTOOL870 is in progress. In general you just type Next at every installation screen except for the Customer Information screen where you must enter the serial number for your software package.

Note: The serial number is located on the back of the CD cover – note that all characters must be entered.



RTU870 Configuration software with all the necessary drivers is now installed on your PC and ready to use. On your desktop you will find an icon for the RTU870 configuration software.

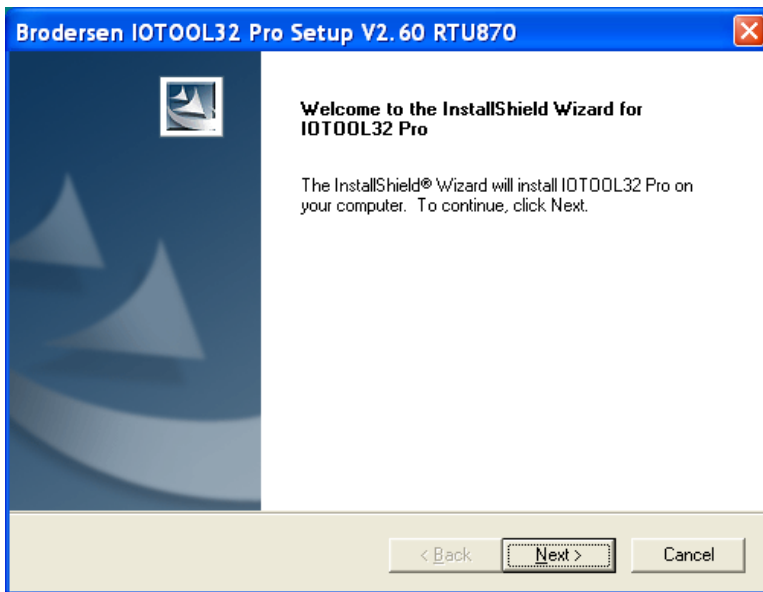


## 6. Detailed Installation Guide

Before you start installation of the software please make sure that you not have any prior versions of IOTOOL32Pro and RTU870 Configuration Tool installed. If that is the case you must uninstall IOTOOL32Pro from the Remove Software option in the Control Panel and delete the RTU870 Configuration Tool folder on your desktop.

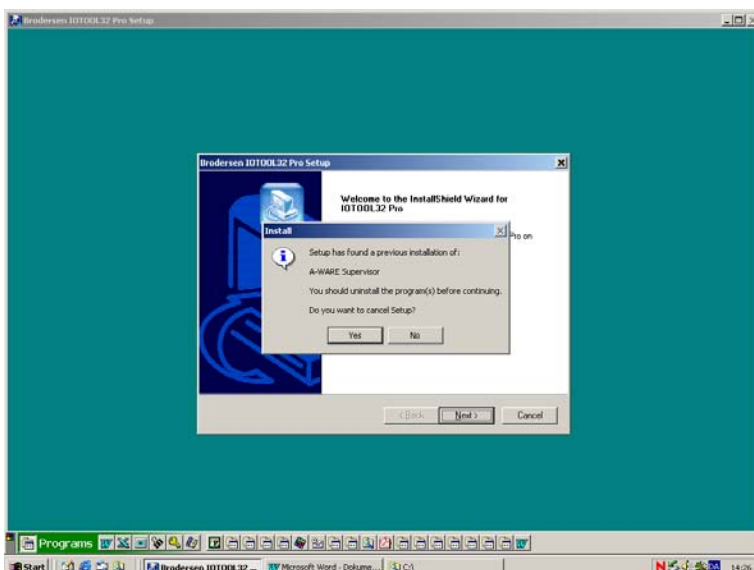
Now you place the installation CD in you CD drive and if autorun is enabled on your PC the installation will start automatically. If not you must type D:\setup in the Run windows located under the Start button on your MS Windows desktop. Use the same procedure as if you were installing any other software from a CD.

Now the installation of the IOTOOL870 is in progress. The first window you will see is:



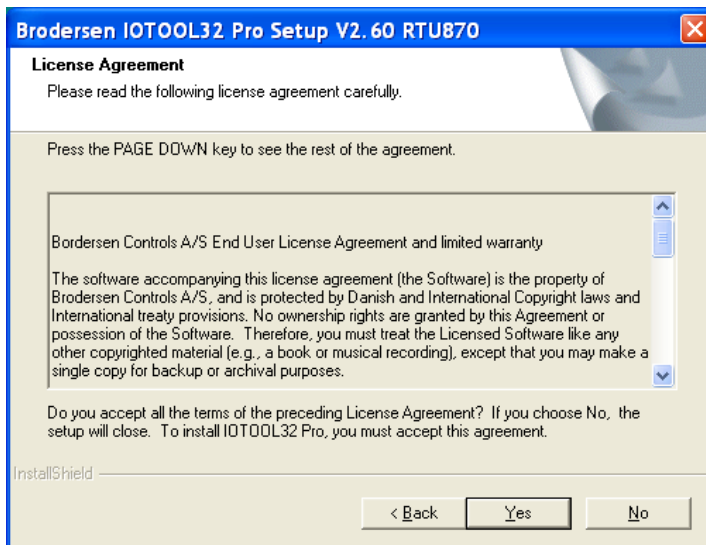
Hits Next to proceed.

If you an earlier version of IOTOOL32Pro or other IOTOOL32 components installed you will get this information on your screen:



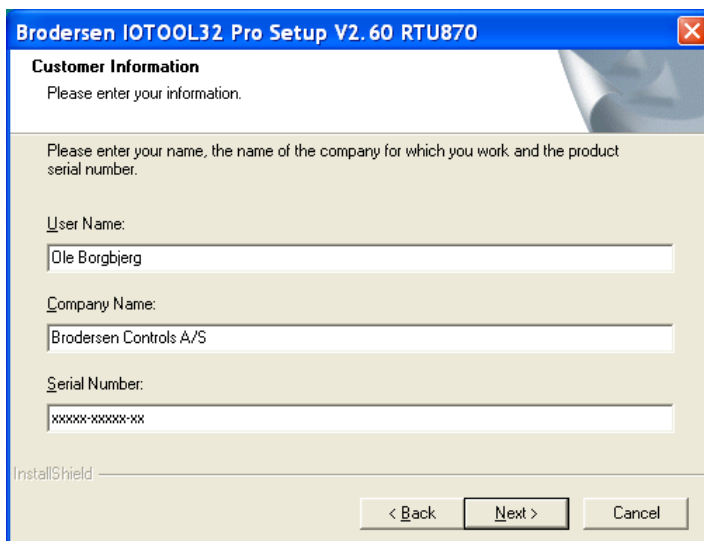


If that's the case you must cancel the installation and remove/uninstall the previous version before you re-start the installation again. If you not have any older versions installed you will get the window:



Please read the License Agreement carefully. It is only allowed to use this ITOOL870 Configuration tool on one PC. Enter Yes to accept the License Agreement.

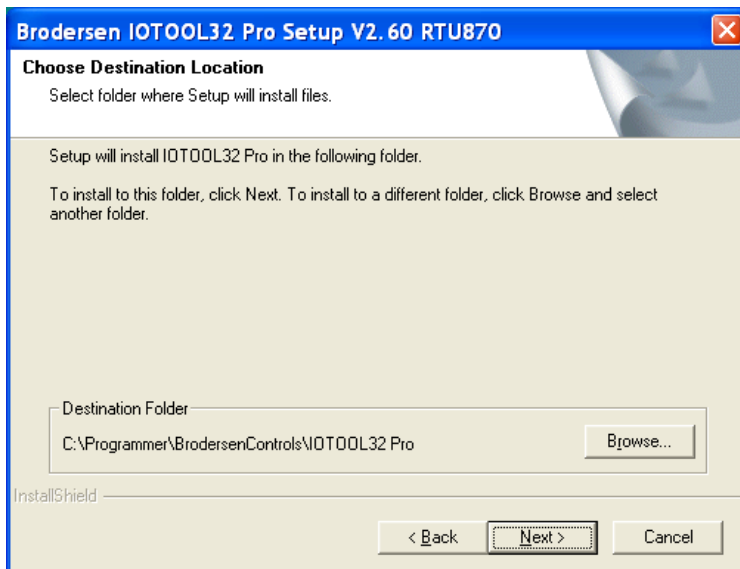
The installation program will read the user information from the Windows operating system and you must here enter the serial number for your software package. The serial no is located on the back of the CD cover – note as shown above that all characters must be entered. Hit Next to continue. If the serial number is not correct you will be alerted.



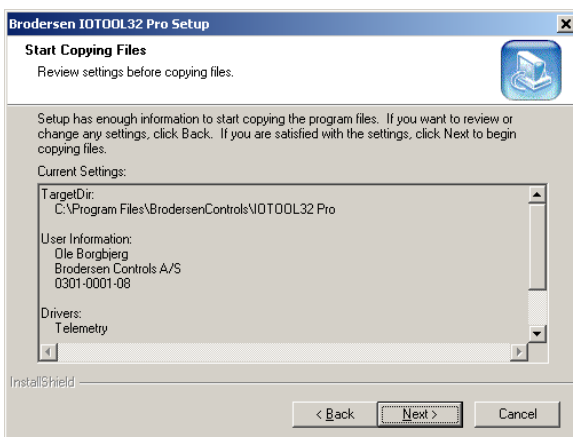




Then follows the information of where on your PC the software is installed. Accept choosing Next or select another folder.



Now the installation program is ready to copy all the appropriate files to your PC.



Hit next to start the file copying process.

After copying all the program files to your PC, the installation program tells you that it will place a program start icon on your desktop and the last installation windows occur now telling you that IOTOOL32 has been installed on you PC – hit Finish to finish the program installation.

Now is the IOTOOL870 software with all the necessary drivers installed on your PC. The CD can now be removed from your CD drive and the PC must be rebooted. On your desktop you will find an icon for the RTU870 configuration software. Start the configuration tool by double clicking this Icon.

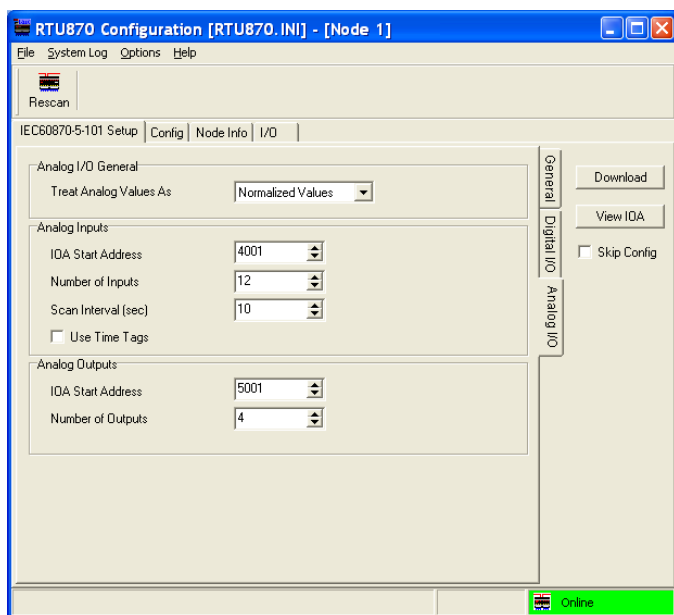


## 7. User Guide

### 7.1 Starting RTU870 Configuration tool.

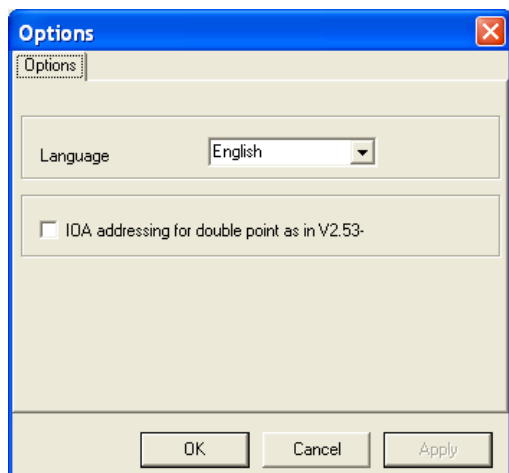
On your desktop you will find a RTU870 Config icon. Start the configuration tool by double clicking it.

During start up the drivers will be initiated. You will see it as small pop up boxes with progress bars popping up and disappearing again. And finally the configuration tool will start its main user interface:



### 7.2 Selecting language

In the option menu you are able to change language. After changing language the program must be re-started to use the selected language. English and German languages are supported. You may also change the way the double point information and double command are addressed. If you mark the IOA addressing field, the addressing is compatible with earlier versions of IOTOOL870.



### 7.3 Special program options

The Configuration tool has some helpful options, which you will find in the System Log drop down menu. The options are listed below.

#### 7.3.1 View system log



If you activate view system log you will get an extra window in the bottom of your Configuration tool. It is a system log which report all event and activities performed by the driver communicating with the RTU.

### 7.3.2 Lock at last

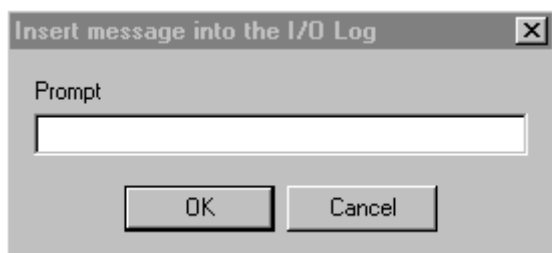
The Lock at last is default activated at means that the Configuration tool will scroll the system log so the last log line is viewable in the system log window.

### 7.3.3 Clear the system log

Clears the system log – see 7.3.1.

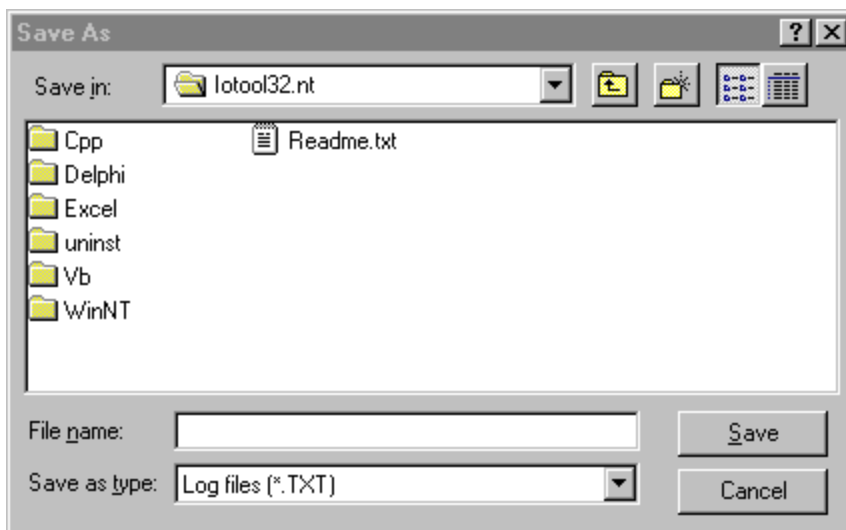
### 7.3.4 Add Msg to System Log

Let you add comments to the System Log by prompting the dialog box below.



### 7.3.5 Save System Log As

Saves the System Log in a filename



### 7.3.6 Print System Log

Prints the System Log on the printer.

### 7.3.7 Help Options

Under the Help drop down menu you find the software information and version.

Help for using the program is basically only in this document and in the help and information line in the bottom of the screen. When you point on a specific button of area, some help text is shown here.

## 7.4 Procedure for setting up the RTU870

First a RTU870 must be physically connected to the PC. Use the configuration cable as defined in the *Installation and Wiring Guide*. If I/O expansion modules (UCL-xx) are used, they must be connected before applying power in order to get the right module configuration. Apply power to the RTU. Read the module data by choosing the Rescan option. The Rescan pop up menu show up and you must



select the right COM port used. All other settings are fixed and can not be changed. Select OK and the configuration software is scanning the module i.e. data from the module are read and listed in the Config, Node info and I/O folder. NOTE: The settings for the IEC60870-5-101 can not be read but only downloaded into the module.

**Note:** Number of I/Os supported by RTU870 is limited – see Appendix B for detail of how to calculate the maximum I/O configuration.

After the rescan procedure is finish the module should go on-line – check that the field in the low right corner turned green and are reporting RTU Online. If not check if the cable is correct, module is power up etc. And try to rescan the module again.

The RTU870 is now ready for setting up. All the adjustable parameters can now be configured according to the section *Setup and Configuration Parameters*.

When all settings is done as required in the actual application the setting can be downloaded to the RTU module by pressing the Download bottom. If only the new settings from the IEC60870-5-101 Setup folder is required to download and the settings in the Config folder want to be kept, you can put a mark in Skip Config option just under the Download bottom.

## 7.5 Saving and Restoring Configuration Data Files

Saving the settings in the configuration tool is done by selecting File and Save as.... The settings is saved in a project file (\*.ini). Use filename which can be recognised when you later want to use it again. The project (\*.ini) file contain all settings and can be copied and used on other PCs.

When you want to download the data from a saved project file, just connect the actual RTU870, open the file and make sure that the RTU is online. Then just press Download and all the settings from the file is downloaded into the RTU. If you want to store the settings to more RTUs, just connect a new RTU, apply power and press the download bottom again. Every time you must make sure that the module is online before downloading.

## 7.6 Closing the RTU870 Configuration Tool and the Drivers.

**Important note:** When you are running the RTU870 tool, you are using the IOTOOL32 driver on the COM port. The driver requires full service from the COM port and it does not accept any other programs are using the COM port. After closing the RTU870 software, you must close the basic driver. You find the driver icon on the bottom right side of your screen. Point at the icon, right click your mouse and select close to close the driver – now your COM port is free for use by other programs.



## 8. RTU870 Address Information

The system for addressing single and double point information in monitor and control direction is necessary to know when setting up the RTU870 with this configuration tool. In general you can define the number of ASDU type and the IOA start address.

**NOTE:** The addressing of Double Point Information and Double Commands is changed in his version compared to earlier versions.

The “View IOA” can be used to view which Information Object Addresses (IOA) have been generated after configuring the RTU870. The IOTOOL870 support settings of:

- Counter inputs (always fixed to 2 if enabled)
- Single point information (digital input)
- Double point information (double digital inputs)
- Single command (digital/relay output)
- Double command (digital/relay output)
- Measured values (analogue input)
- Setpoint Command (analogue output)

Node status word is sent spontaneously as scaled value with selectable IOA.

Old value of Status is sent spontaneously as scaled value with IOA of the node status +1.

Battery Error is reported as selectable IOA.

Mains Error is reported as IOA of battery error +1.

### 8.1 Addressing of physical I/Os to ASDU IOAs

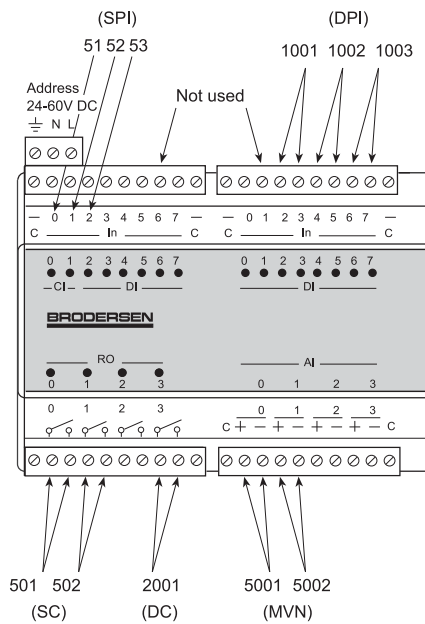
With the Configuration tool you can based on the physical inputs on RTU870, define the number of single and double point information in the EN/IEC60870-5-101. The general rules for addressing IOA's on an RTU870 system are;

- All IOA addresses are counted from the left side.
- Single Point Information's and Single Command's are assigned to physical inputs starting from the left side.
- Double Point Information's and Double Command's are assigned to physical inputs starting from the right side.
- Measured Values and Setpoint's are assigned to physical analogue I/O starting from left side.
- If I/O expansion module is added, they are just counted like they were all placed on one big module.
- If Counter inputs are enabled the 2 first physical inputs from the left side is reserved for counter inputs (only valid for UCR-12I, -24IO and -28IO types).

Example 1:

An RTU870 type UCR-24IOAxxx with NO I/O Expansion module connected is configured to;

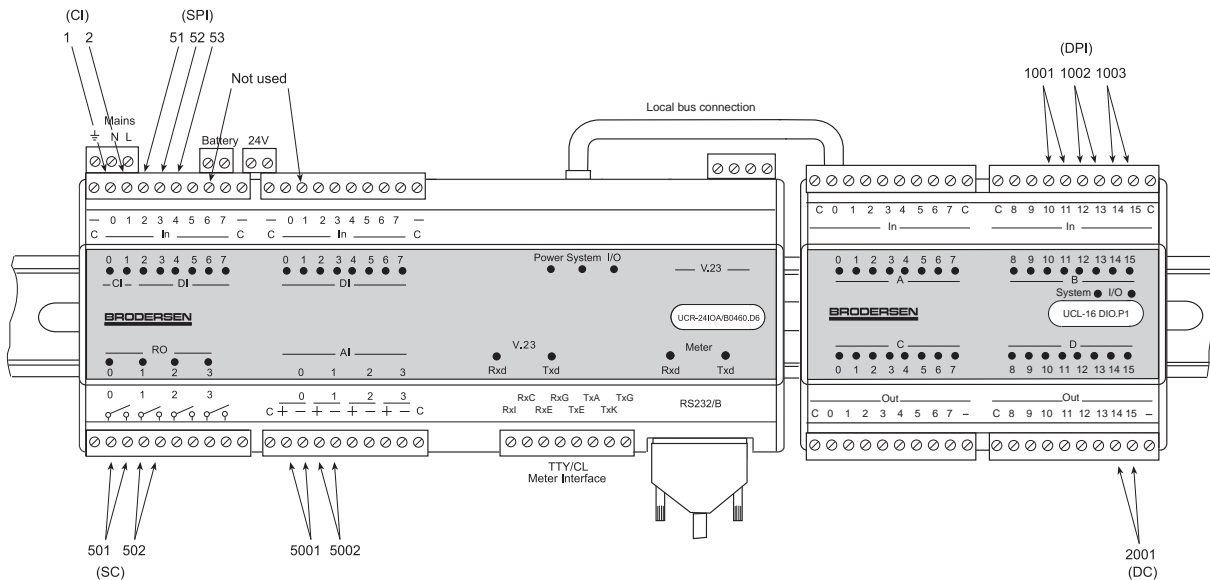
- No counter inputs
- 3 x Single Point Information's starting with 51
- 3 x Double Point Information's starting with 1001.
- 2 x Single Command's starting with 501
- 1 x Double Command starting with 2001
- 2 x Measured Value starting with 5001



**Example 2:**

An RTU870 type UCR-24IOAxxx with I/O Expansion module UCL-16DIO connected is configured to;

- Integrated Totals (counter inputs) enabled, starting with 1
- 3 x Single Point Information's starting with 51
- 3 x Double Point Information's starting with 1001.
- 2 x Single Command's starting with 501
- 1 x Double Command starting with 2001
- 2 x Measured Value starting with 5001
- 



Digital outputs can physically be digital transistor outputs or relay output as they are threaded equal.

See appendix A for example of IOA list.



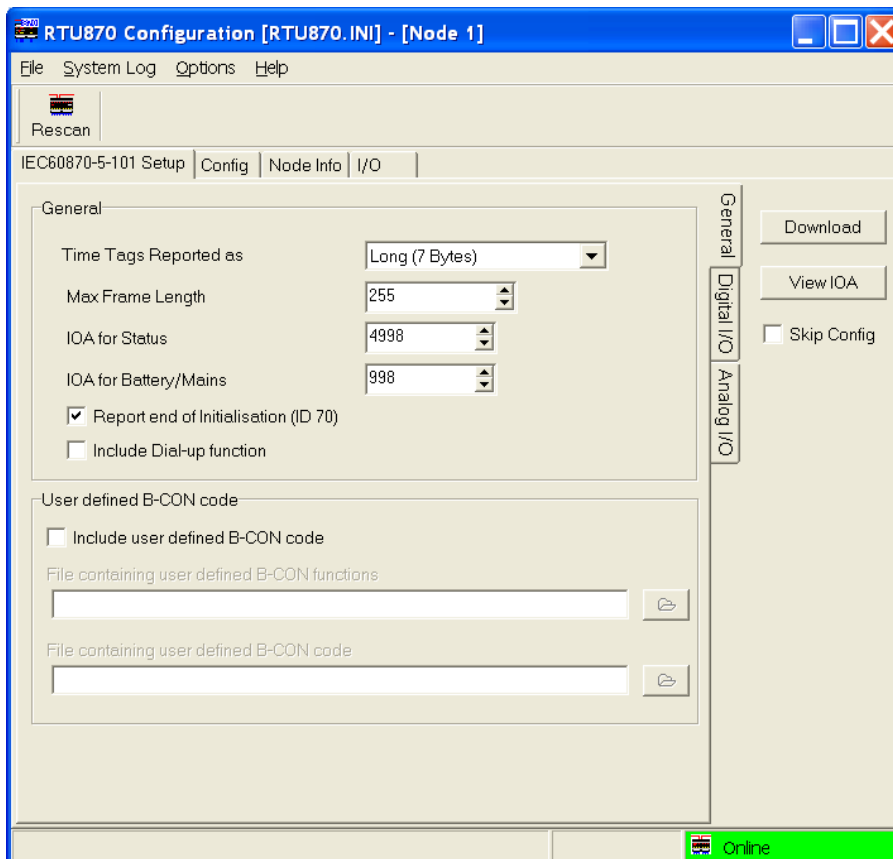
## 9. Setup and configuration parameters

The configuration tool provides setup of several parameters in the RTU. Basically you can setup EN/IEC60870-5-101 specific parameters and general module parameters.

### 9.1 EN/IEC60870-5-101 parameters

The IEC60870-5-101 parameters are done in the IEC60870-5-101 Setup folder. There are 3 sub-folders which provide you with the following configuration options:

#### 9.1.1 Sub-folder General



##### 9.1.1.1 Time Tags

Time Tags Reported as none, short (3 bytes time tags) or long (7 byte time tags). When time tags is selected all information's except measured value information's are reported with the selected type of time tag

##### 9.1.1.2 Max. Frame length

Define max. Protocol frame length. Default set to 255 bytes. Adjustable from 20-255 bytes.

##### 9.1.1.3 IOA of Status

The RTU870 status register are reported as a Measured Value if changed. Both the new and old status is reported in this order. You must define the IOA start address for these status registers here.

##### 9.1.1.4 IOA of Battery/Mains status

If the RTU870 is with UPS, Battery low and Mains fault are reported as Single Point Information at change in the mentioned order. You must define the start IOA address of these status information's. Note that the IOA for this is always inserted even if there is no UPS.

##### 9.1.1.5 Report end of ini

Enable end of initialisation – the RTU will send EOI ID70 when re-powered.



### 9.1.1.6 Include dial-up

Enable the dial-up function in the RTU870 when using analogue or GSM dial-up modems for communication.

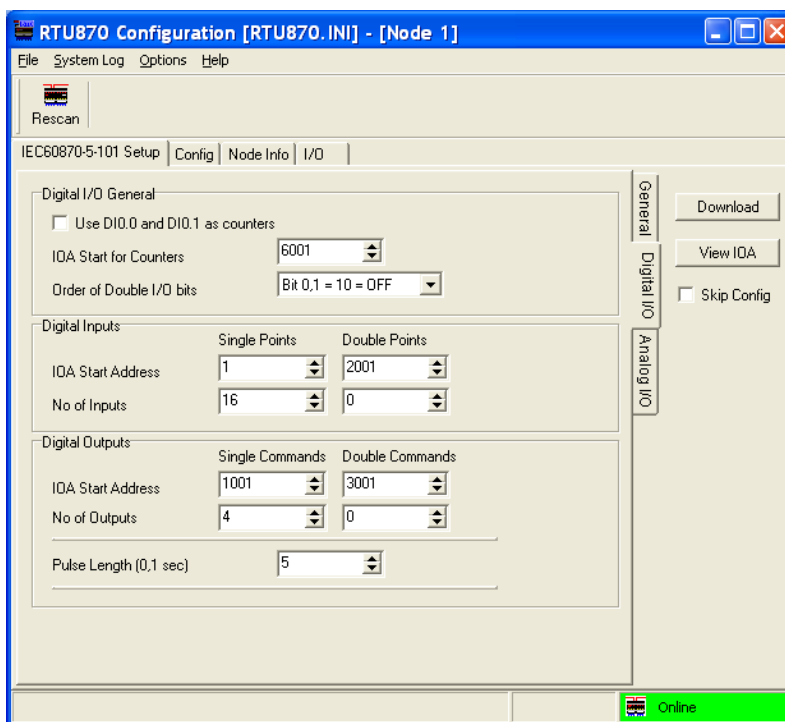
### 9.1.1.7 Include user defined B-CON code

You may add your own B-CON code to handle extra functions in the RTU-870. The code you want to add has to be done with the B-CONW editor and save as \*.pgm files. As the use of B-CON functions has to be placed separately in the application program it has also to be selected separately.

The Configurator generates a B-CON program with the same name as the project + .pgm. Here you can see where the "User defined Functions" and the "User Defined code" is added. The generated program contains also a list of bm-registers that is reserved by the program.

More information about B-CON is to be found on our homepage.

## 9.1.2 Sub-folder Digital I/O



### 9.1.2.1 Digital I/O General

Configure if the first 2 digital inputs on UCR-121, UCR-24IO and UCR-28IO are used as counter input. Define the start address of the Integrated Totals (counter inputs). Define how double point information is reported. Default first bit = 1 and second bit = 0 report OFF.

### 9.1.2.2 Digital inputs (double and single point information)

Here you can define the number of single point and double point inputs, and the start IOA address of each type. When scanning the module it will read number of physical inputs and let you define how many is reported as single point information and how many is reported as double point information.

### 9.1.2.3 Digital outputs (double and single commands)

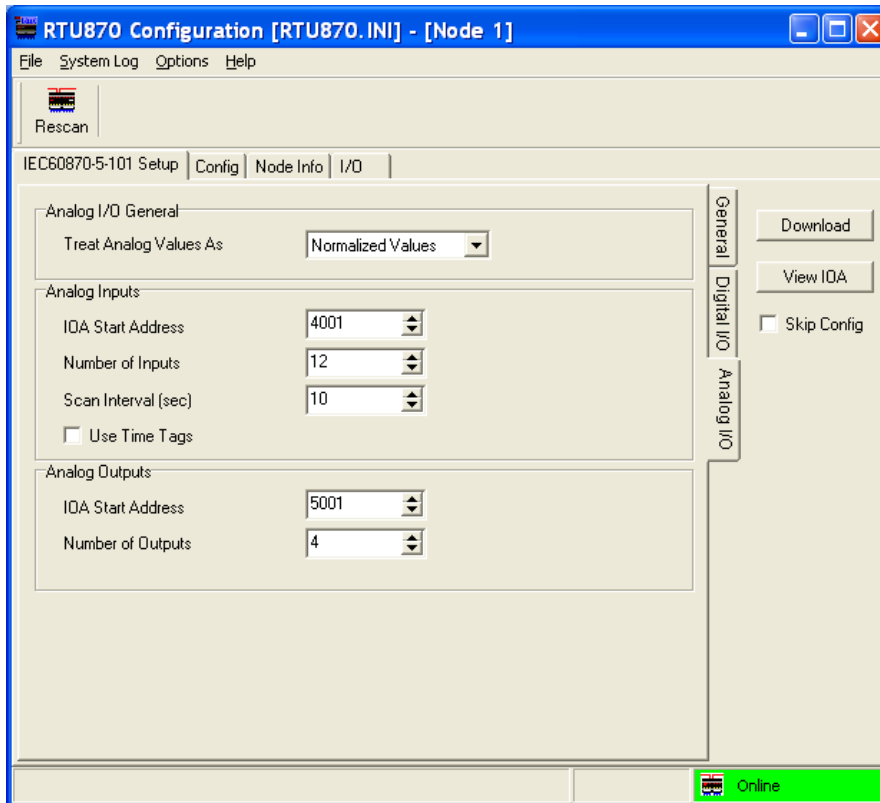
Here you can define the number of single point and double point commands, and the start IOA address of each type. When scanning the module it will read number of physical outputs and let you define how many is reported as single point commands and how many is reported as double point commands.





The pulse length can be configured in step of 0,1sec (100ms). Range: pulse lengths from 0,2 to 100sec.

### 9.1.3 Sub-folder Analogue I/O



#### 9.1.3.1 Analogue I/O General

Configure if analogue inputs are reported as Normalized or Scaled values.

#### 9.1.3.2 Analogue inputs (measured values)

Define number of analogue inputs (measured values) used, and the start IOA address .

The RTU scan interval for analogue values (measured values) is selected in seconds. Range:1-120sec.

You may also define if the Measured values is reported with time tag.

#### 9.1.3.3 Analogue Outputs

If your RTU870 node has physical analogue output they can be defined here. Also the IOA start address is defined.



## 9.2 General module parameters – Config folder

In the Config folder the general module settings are setup. They are read from the RTU when Rescan button is pressed, or they are read when loading a project file, File|Load|Project.



The options are described in the next sections.

### 9.3 COM1 cfg.

This is the header for the configuration of EN/IEC60870-5-101 driver parameters

#### 9.3.1 Link addr

The DIL switches on the RTU870 do only have the possibility to address up to 255. If want to use 2 octets in addressing you can here add a address that it added to the value of the DIL switch settings. E.g. if you set the address on DIL switches to 1 and enter 100 here – the actual link (and ASDU) address will be 101.

#### 9.3.2 LinkAddrOct

Define if 1 or 2 link address octet is used.



### **9.3.3 Baud rate**

Define the baud rate for the main serial port. 300-9600 baud. This option is not available in the RTU870 with built-in V23 modem.

### **9.3.4 Use E5 resp**

Option for using E5 response. It is possible to select; Not used, used as acknowledge and used as acknowledge and no data.

### **9.3.5 Resp. Delay**

Defines the response delay in times of 10ms.

### **9.3.6 RTS Leading**

Defines the delay from the RTU is activating the RTS to the transmission of the first character.

### **9.3.7 RTS Trailing**

Defines the delay from the RTU is transmitting the last character to de-activating RTS.

### **9.3.8 Retry counts**

Defines the number of retries which should be made to the same telephone number before giving up or continuing to the next number, if the call is not successful. Default value: 3, Range: 0 .. 10.

### **9.3.9 Max comm cnt.**

Defines the number of times the input and output will be read and written before the module makes a hang-up. If Max Com Count=256 the PC is responsible for correct hang-up.

*This option should normally not be changed.*

### **9.3.10 Subs. to try.**

Defines the number of subscribers to try after being through the number of retries on the first number in the list of phone numbers. If the value is set to 3, it will try number 1, 2 and 3 in the phone no list. Default value: 1, Range 1-10.

### **9.3.11 Redial delay.**

Defines the delay from an unsuccessful attempt to dial to a new attempt to establish connection. Default value: 90 sec, Range: 2-120 sec.

### **9.3.12 Tel. no.**

The maximum number of telephone numbers stored in RTU is 30, the maximum length is 20 characters. The telephone numbers can although include some special characters to control the dialling function of the modem.

### **9.3.13 Modem init.**

The modem initialisation string has a maximum length of 60 characters. This string contains the configuration data for the connected modem. It will be sent cyclic to the modem and every time a connection is established by the RTU. Default value: ATV0E0&C1S0

### **9.3.14 PIN code.**

If GSM modem is used and PIN code is required for the SIM card, the PIN code must be entered here. Be careful to enter the right PIN code – if not, the three normal attempts will quickly be used up and a PUK code is required to re-open the SIM card again. Use a normal mobile telephone to change PIN code parameters and enter PUK codes.

Default: blank

### **9.3.15 Modem Re-init.**

Defined the time in minutes between cyclic re-initialisation of the modem. If the modem of some reason is reset and the required modem settings not has been save in the modem flash, the modem will start up with its default settings. With this option you can make sure that the modem is initialised periodically. Default value: 0 min, range 0-999min.

### **9.3.16 Dial back**



Enable or disable the dial back function.

#### **9.3.17 User**

User defined value. Constant value can be used in B-CON application / IEC870. This field is normally not used in standard module but are kept for special applications.

#### **9.3.18 Date/Time**

Real time clock adjustment. The actual time in the module can be monitored and adjusted either by entering the time or by copying the PC clock to the module.

#### **9.3.19 Boot delay**

You can define the time after applying power that the RTU870 boots. If you have added several I/O Expansion modules, you must make sure that they are all up running before booting take place as the I/O configuration is read during boot. Default set to 2s.

#### **9.3.20 S0 Cnt Type**

Define the counter type. Absolute values, accumulated values or counters disabled are possible selections.

#### **9.3.21 S0 Interval**

Define the length of the time between counter values is transferred to the IEC870-5-101 queue. Range: 1min to 240min is possible, however the selected value has to dividable into 1 day (24hours).

#### **9.3.22 Analogue Range**

Select the analogue input range; 0-20mA or 4-20mA. Note that underflow alarm is only valid in range 4-20mA.

Note that the setting is ONLY for the RTU870 module itself. Analogue inputs on Expansion I/O modules can not be configured this way. Also note that the physical analogue input range has to be 0-20mA (type D6) to take advantage of this option.

#### **9.3.23 COM2 cfg – Modbus Slave Port**

This is the header for the configuration of configuration port which also is a Modbus Slave port.

#### **9.3.24 Baud rate**

Define the baud rate for the programming port 300-9600 baud. Default set to 9600baud.

#### **9.3.25 Parity**

Select parity. Default set to None.

#### **9.3.26 Handshake**

Defines the handshake used. Default set to RTS On/Off.

#### **9.3.27 RTS Leading**

Defines the delay from the RTU is activating the RTS to the transmission of the first character.

#### **9.3.28 RTS Trailing**

Defines the delay from the RTU is transmitting the last character to de-activating RTS.



## 9.4 COM 3 cfg Meter Port

This is the header for the configuration of Meter ports.

### 9.4.1 Use Driver

Meter Driver selection. Two options:

- Disabled meter port protocol
- IEC1107

Meter data is transferred transparent in the EN/IEC60870-5-101 protocol to the master station. Contact the manufacture for detailed information.

### 9.4.2 Baud Rate

Define the baud rate for the chosen serial port. 300-9600 baud. Data format is fixed to 8 data bits, even parity and one stop bit.

### 9.4.3 Cmd Msg Time

Define the command message time in seconds.

### 9.4.4 Rsp Msg Size

Transparent buffer size. Used to specify how many bytes from the meter may be putted into the special transparent ASDU frame at a time. Options are 50, 100, 150 and 200 bytes.

## 9.5 Node info folder

In the Node Info folder you find read only module information. The info displayed is:

Firmware name: Name on the firmware installed in the RTU module.  
Firmware No: 5 digit ID no identifying the firmware.  
Firmware Version: Display the module firmware version.  
Release date: Display the firmware release date.

Furthermore you will find the I/O configuration of the module. DI defines no of physical input, despite the fact that the RTU870 has only 14 digital inputs, the 2 counter inputs are listed as DIs.

If you need to know the firmware version of your actual RTU, you can rescan the module and get the version and release date reported in this folder.

## 9.6 I/O folder

The I/O folder is a mirror of the IO database provided by the IOTOOL32Pro software package. The I/O database is in this software version read-only.

In the full version of IOTOOL32Pro you can from the IOExplorer force activation of outputs, read input – both digital and analogue.

The most important field in this folder is the first register shown (the ST register), where a status is reported from the module. If the value in register is 0 it means no errors detected and the Module is online. If any other value than 0 is reported there is an error no reference list, which can be delivered by your module supplier. This is for experience users only. Pointing your mouse at the ST register value will automatically report an error in clear text for a few seconds.



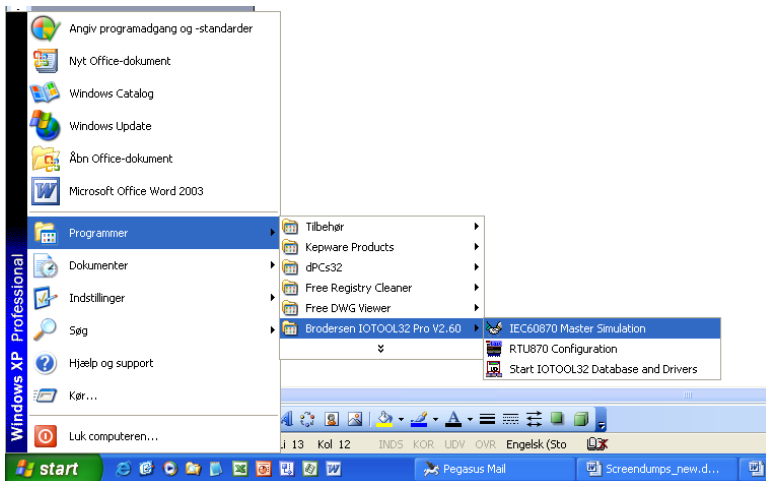
## 10. Uninstalling the software

The software is uninstalled by entering the Add or remove program facility in the Control Panel and uninstall IOTOOL32Pro.

If you during un-installation meet the message “You must close all drivers before uninstalling IOTOOL32”, please look in section 7.6.

## 11. Special notice for Windows Vista users

If you use Vista as your operating system, it might give you some problems when starting the IOTOOL.870 tool. Caused by Vista’s restricted rules for executing programs, it might be necessary to start IOTOOL32 Database and Drivers before you start the RTU870 Configuration. In other OS the database and drivers are started automatically.





## Appendix A IOA List

### Printout of IOA list from the RTU870 Configuration tool.

Battery/main status is reported as Single point info.  
Module general status is reported as scaled values.  
See example list below:

```

////////////////////////////////////
/ IOA Address List
////////////////////////////////////
/ IOA( 00001 )( ST0 )( WM22..WM24 ) defined as Counter, COT=3
/ IOA( 00002 )( ST0 )( WM26..WM28 ) defined as Counter, COT=3
/ IOA( 00051 )( DI0.2 )( i0.2 ) defined as Single Point Input, COT=20
/ IOA( 00051 )( DI0.2 )( i0.2 ) defined as Single Point Input, COT=3
/ IOA( 00052 )( DI0.3 )( i0.3 ) defined as Single Point Input, COT=20
/ IOA( 00052 )( DI0.3 )( i0.3 ) defined as Single Point Input, COT=3
/ IOA( 00053 )( DI0.4 )( i0.4 ) defined as Single Point Input, COT=20
/ IOA( 00053 )( DI0.4 )( i0.4 ) defined as Single Point Input, COT=3
/ IOA( 00501 )( DO0.0 )( o0.0 ) defined as Single Command, COT=7,10
/ IOA( 00502 )( DO0.1 )( o0.1 ) defined as Single Command, COT=7,10
/ IOA( 01001 )( DI1.10..DI1.11 )( i3.2..i3.3 ) defined as Double Point Input, COT=20
/ IOA( 01001 )( DI1.10..DI1.11 )( i3.2..i3.3 ) defined as Double Point Input, COT=3
/ IOA( 01002 )( DI1.12..DI1.13 )( i3.4..i3.5 ) defined as Double Point Input, COT=20
/ IOA( 01002 )( DI1.12..DI1.13 )( i3.4..i3.5 ) defined as Double Point Input, COT=3
/ IOA( 01003 )( DI1.14..DI1.15 )( i3.6..i3.7 ) defined as Double Point Input, COT=20
/ IOA( 01003 )( DI1.14..DI1.15 )( i3.6..i3.7 ) defined as Double Point Input, COT=3
/ IOA( 02001 )( DO1.14..DO1.15 )( o3.6..o3.7 ) defined as Double Command, COT=7,10
/ IOA( 05001 )( AI0 )( wi2000 ) defined as Normalized Input Value, COT=1
/ IOA( 05002 )( AI1 )( wi2002 ) defined as Normalized Input Value, COT=1
/ IOA( 10000 )( ST0 )( STATUS ) defined as Scaled Value (Current Value), COT=20
/ IOA( 10000 )( ST0 )( STATUS ) defined as Scaled Value (Current Value), COT=3
/ IOA( 10001 )( WM310 )( wm310 ) defined as Scaled Value (Old Status), COT=3
/ IOA( 10010 )( M9.6 )( m9.6 ) defined as Single Point Input, COT=20
/ IOA( 10010 )( M9.6 )( m9.6 ) defined as Single Point Input, COT=3
/ IOA( 10011 )( M9.7 )( m9.7 ) defined as Single Point Input, COT=20
/ IOA( 10011 )( M9.7 )( m9.7 ) defined as Single Point Input, COT=3

```

} Status current value  
} Status old value  
} Battery low alarm  
} Mains Alarm

Note: This document is subject to changes without notice.



## Appendix B Maximum I/O Configuration of RTU870

Theoretically the numbers of I/O on an RTU870 Outstation can be relative high. But as the B-CON Instruction List program handles the EN/IEC60870-5-101 protocol application layer, the numbers of I/Os are limited to the maximum memory allocated to the application program.

To determine the maximum I/O configuration of an RTU870 using the IOTOOL870 Configuration tool, calculation rules listed below can be used.

No	Description (ASDU type etc.)	Type of physical I/O	Memory in bytes
1	Total memory for I/Os	-	20.000
2	1 Single information	1 DI	260
3	1 Double information	2 DI	400
4	1 Single command	1 DO or 1 RO	400
5	1 Double command	2 DO or 2 RO	520
6	1 Measured value	1 AI	150
7	1 Setpoint command	1 AO	140

NOTE: When calculating no considerations of memory for basic household, no or full time tags and use of integrated totals have to be taken. Memory for these functions have been reserved. Note that the memory used is only related to the numbers of ASDU's which is configured in IOTOOL870. Any I/O's not used in the EN/IEC60870-5-101 application do not occupy any memory.

### Calculation Example

An application requires:

- 40 Single information's
- 8 Single commands
- 16 Measured values

Physical modules required must be:

- RTU870 Slave;
  - 1 x UCR-8DIO
- I/O Expansion modules;
  - 1 x UCL-32DI
  - 2 x UCL-08AI.Dx

Calculating (verifying) I/O handling:

40 Single information's	40 x 260bytes	= 10.400bytes
8 Single commands	8 x 400bytes	= 3.200bytes
16 Measured values	16 x 150bytes	= 2.400bytes
Total number of bytes used		= <u>16.000bytes</u>

As the total number of bytes is less than 20.000 – the I/O combination is OK.